

Remarks

Claims Status

Claims 1-16 were originally filed in this application. In the Office Action dated June 23, 2008, claims 1-16 were rejected. Applicant has amended claims 1, 3 – 6, 9, 10, 12 and 14 – 16 and added new claim 17. Support for the amendments can be found at least in the originally filed claims and throughout the application, such as at paragraph [0007], [0009], [0010], [0028] and [0029] of the application as published. No new matter has been added.

Claim Objections

Claim 4 – 7 and 13 were objected to as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Applicant respectfully submits that the claim amendments set forth above overcome the Examiner's objections.

Claim Rejections

Claims 1 – 16 were rejected under 35 U.S.C. §112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 3 – 11,13 and 14 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,256,100 to Banet et al. ("Banet").

Claim 2 was rejected under 35 U.S.C. §103(a) as being obvious over Banet in view of U.S. Patent No. 6,795,198 to Fuchs et al. ("Fuchs").

Claims 12, 15 and 16 were rejected under 35 U.S.C. §103(a) as being obvious over Banet in view of U.S. Patent No. 5,546,811 to Rogers et al. ("Rogers").

Applicant respectfully submits that, for the reasons set forth below, the above claim amendments overcome these rejections.

Claim Rejections Under 35 U.S.C. §112

Claims 1 – 16 were rejected under 35 U.S.C. §112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Specifically, in independent claim 1, the limitations “the thermal grating” in line 6 and “the surface profile” in line 11 were found to have insufficient antecedent basis.

Applicant respectfully submits that the claim amendments set forth above overcome these rejections.

Claim Rejections Under 35 U.S.C. §102(b) and §103(a)

Independent claim 1, as amended, recites a method for measuring an unfilled patterned structure. The claim requires irradiating the unfilled patterned structure with a spatially periodic laser intensity pattern in order to excite surface acoustic waves, diffracting a probe laser beam off the generated surface acoustic waves to form a signal beam, detecting the signal beam as a function of time to generate a signal waveform, determining a surface acoustic wave phase velocity from the signal waveform and determining at least one property of the patterned structure based on the effect of the surface profile of the unfilled patterned structure on the surface acoustic wave phase velocity. In this method, the pattern comprises features each having a width dimension and the surface acoustic waves have a wavelength larger than the feature width dimensions.

Banet does not determine “a surface acoustic wave phase velocity from the signal waveform” and determine “at least one property of the patterned structure based on the effect of the surface profile of the unfilled patterned structure on the surface acoustic wave phase velocity,” as recited in claim 1, as amended. Rather, Banet describes a method for measuring the thickness of thin films near a sample’s edge and in a damascene-type structure. More specifically, Banet discloses a measurement principle similar to conventional ISTS measurements of thin films, in that it is based on the dependence of the surface acoustic wave velocity on the thickness of a thin film structure. Therefore, even if the damascene structure has a surface topography (e.g., due to an imperfect polishing process) as required by the present claims, the method described in Banet does not measure this topography, but rather the thickness of the structure.

In contrast, the measurement in the present invention is based on an entirely different physical phenomenon. The present claims recite making a measurement is based on the dependence of the surface acoustic wave velocity on the unfilled pattern structure (i.e., the surface profile), rather than on the film thickness. Not only is this different from Banet's approach, but in fact, measurement of an unfilled patterned structure is not possible with the method disclosed in Banet.

Neither Fuchs nor Rogers provides what Banet lacks. Briefly, Fuchs describes a method for measuring thin films and semiconductor substrates using reflection mode geometry. (Abstract.) Rogers describes a method for determining the residual stress in an unsupported region of a thin film. (Abstract.) Although these references are cited by the Examiner as relevant to specific features in various dependent claims, it is noted that neither reference teaches or suggests "determining a surface acoustic wave phase velocity from the signal waveform" and "determining at least one property of the patterned structure based on the effect of the surface profile of the unfilled patterned structure on the surface acoustic wave phase velocity," as recited in claim 1, as amended.

Thus, none of Banet, Fuchs or Rogers, alone or in combination, discloses or suggests the subject matter of independent claim 1 as amended.

Conclusion

Applicant respectfully submits that, in light of the foregoing amendments and remarks, claims 1 – 17 are in condition for allowance, and requests that the application proceed to issue. If, in the Examiner’s opinion, a telephonic interview would expedite the favorable prosecution of the present application, the undersigned attorney would welcome the opportunity to discuss any outstanding issues and to work with the Examiner toward placing the application in condition for allowance.

Respectfully submitted,

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